Tutorial

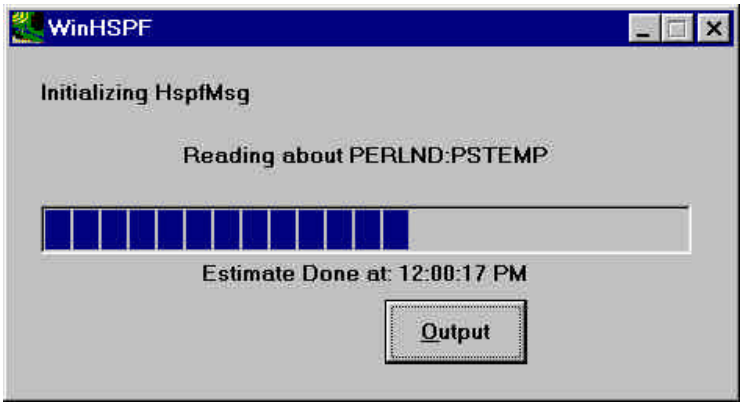
This section presents detailed examples illustrating the use of WinHSPF. The most effective way to use this section is by running WinHSPF and working through the lessons. This assumes that WinHSPF and its associated example data have been installed on your computer. For instructions on how to obtain and install WinHSPF, see the Obtaining WinHSPF section.

- Lesson 1 shows how to build a new UCI file from using the files output from the BASINS HSPF option.
- Lesson 2 shows how to open any existing UCI file in WinHSPF.
- Lesson 3 shows how to execute the HSPF Model and review the results.
- Lesson 4 shows how to specify timeseries to be output from the simulation.
- Lesson 5 shows how to change HSPF parameters and save the changes as a new scenario.
- Lesson 6 shows how to model a watershed management practice.
- Lesson 7 shows how to add point source data to a simulation from a variety of data sources.
- Lesson 8 shows how to modify the specified meteorological data contributing to each model segment.

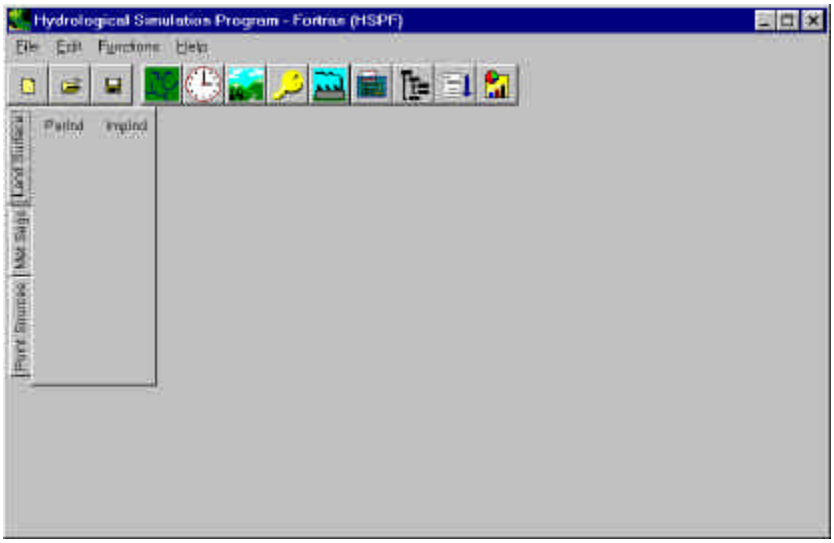
Lesson 1: Creating a New Project

Creating a new WinHSPF project means creating a new UCI file, since all WinHSPF project information is stored in the UCI file. When using WinHSPF from the BASINS system, the user will automatically enter WinHSPF at the **Create Project** window. When using WinHSPF apart from the BASINS system, the user will have to choose **Create** from the **File** menu or click on the  icon on the toolbar to enter the **Create Project** window. Whichever way WinHSPF is started, the **Create Project** feature assumes that the user has created a set of intermediate files from BASINS (.wsd, .rch, .psr, and .ptf) that transfer data from the BASINS GIS interface to WinHSPF.

As WinHSPF starts, an initialization process begins, during which the contents of several files are read into memory, including the files 'HspfMsg.mdb' and 'starter.uci'. The progress will be visible in the status window.

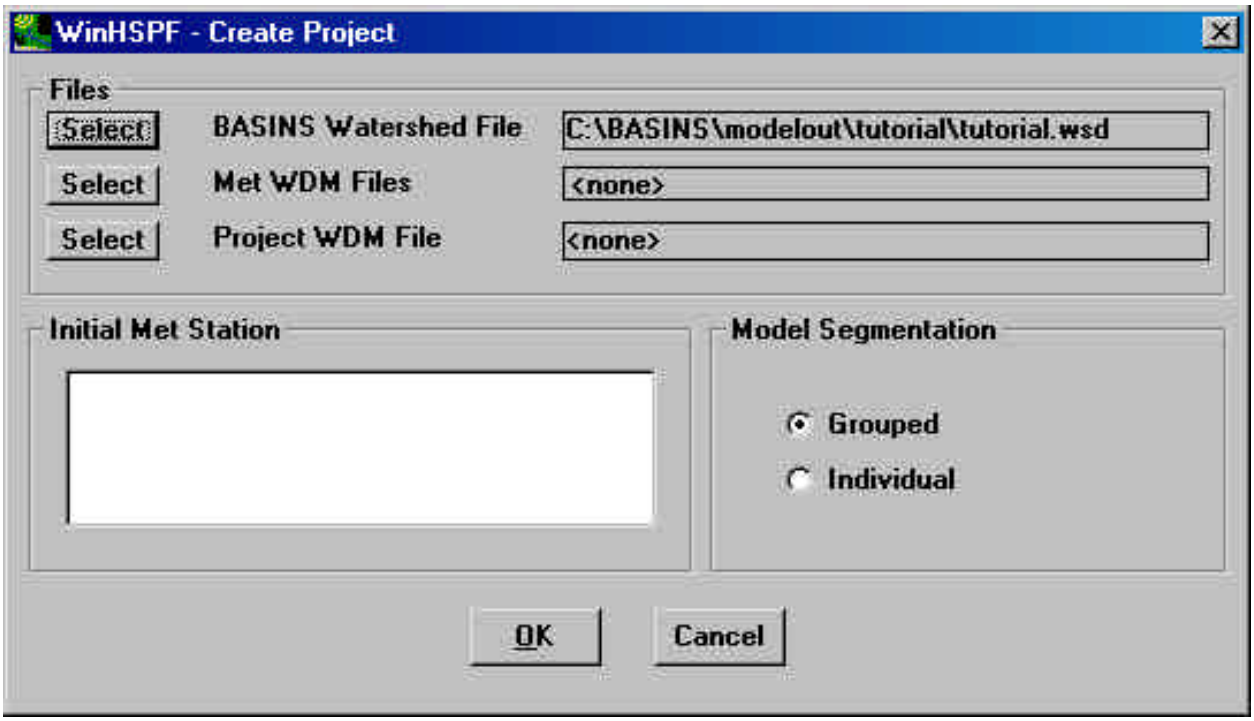


After initialization is complete, either one of two windows will appear, depending upon the way WinHSPF was started. If the user has started WinHSPF independently from BASINS, the **Hydrological Simulation Program - Fortran (HSPF)** window, the main WinHSPF window, appears.



The user should select the **File** menu and then choose the **Create** option. At this point the window entitled **WinHSPF - Create Project** will appear.

If coming from BASINS the user is immediately taken to the **WinHSPF - Create Project** window.



The **Create Project** window contains **Select** buttons for three types of files, a list for selecting a met station, and a set of radio buttons for choosing between two land surface segmentation options. The first type of file available for selection is the BASINS Watershed File. When coming from BASINS, the text box next to this name will already be filled in with the name of the '.wsd' file for the current BASINS project. The second type of files that can be selected are the Met WDM Files. Up to 3 met WDM files can be selected. These files generally reside in the 'met_data' folder, but actually any other WDM file could be referenced as a met WDM file. The third type of file is the Project WDM File. This file will contain the point source inputs to the model as well as any output time series from the HSPF simulation.

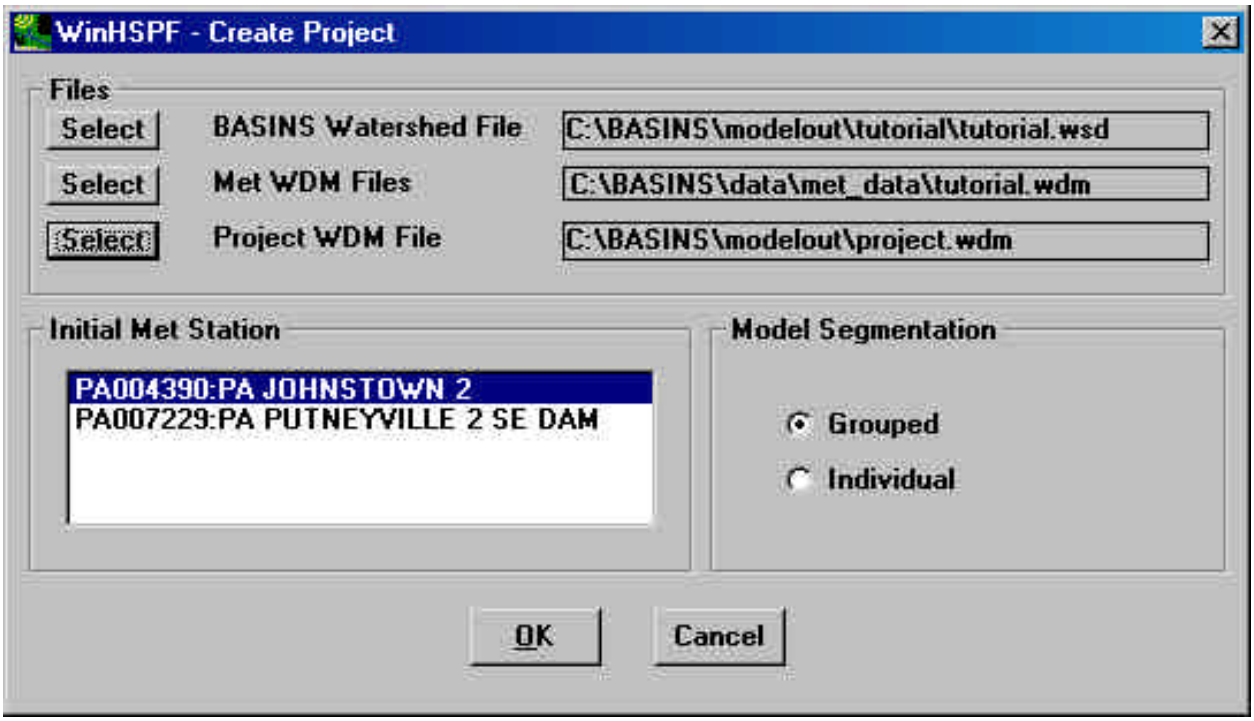
If the box next to **BASINS Watershed File** does not contain a file name, select tutorial.wsd from the 'tutorial' subdirectory. To do this, click the **Select** button next to the **BASINS Watershed File** text, and in the following file dialog, select the 'tutorial.wsd' file. Click the **Open** button, and the name of this file will appear in the **BASINS Watershed File** box in the **Create Project** window.

Next, select tutorial.wdm from the 'met_data' subdirectory as the Met WDM File. The file name will now appear in the box next to **Met WDM Files**. Then select project.wdm from the 'modelout' subdirectory as the **Project WDM File**. If this file does not already exist, type the name in the file name box and it will be created .

Once one or more met WDM files are specified, the **Initial Met Station** list will be populated with the identifier corresponding to met stations available for use in the new HSPF project. One item from this list should be selected in order to have some met data included in the HSPF simulation. (After the new

project has been created other met stations may be added through the WinHSPF interface.) Leave the first option in this list selected for this tutorial.

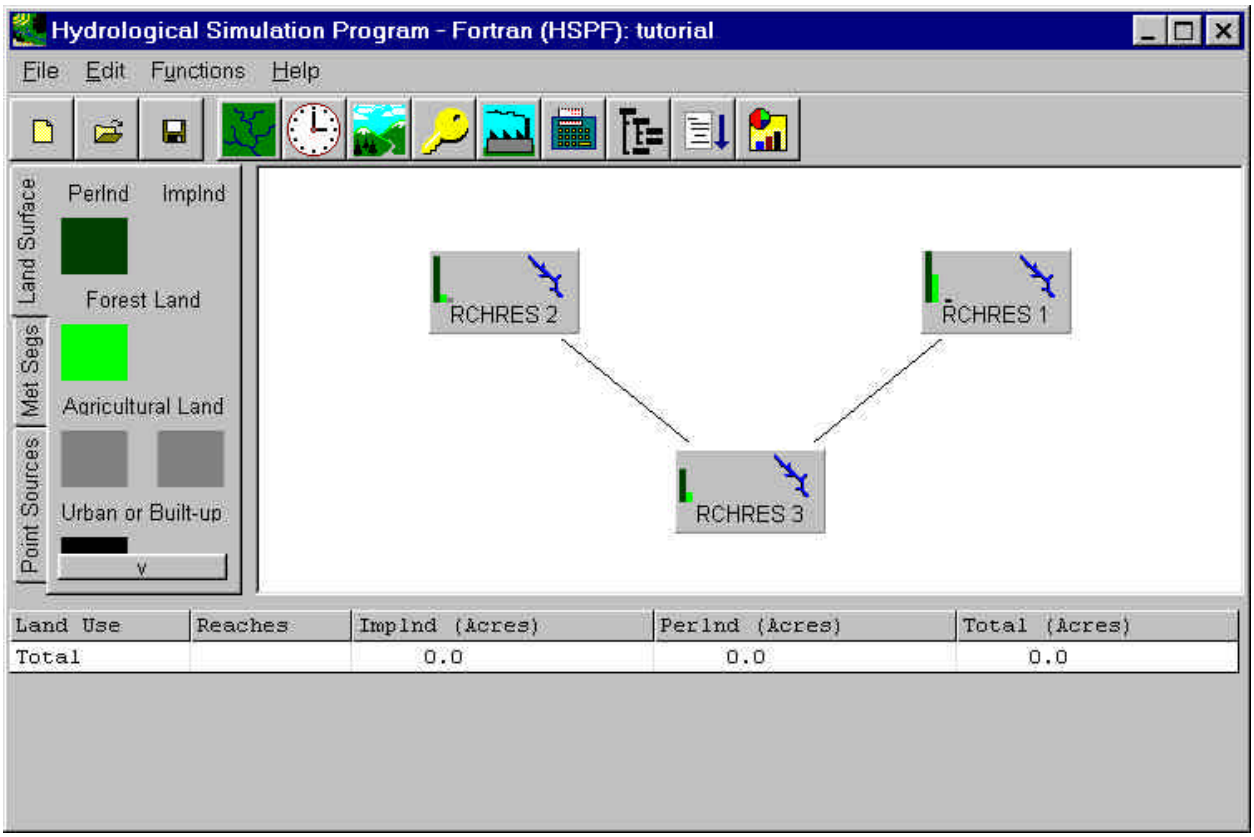
In the **Model Surface Segmentation** radio buttons, the **Grouped** option creates a single model segment (one PERLND/IMPLND per land use) for all collective subbasins, and the **Individual** creates a single model segment for each subbasin. For example, assume the watershed delineation contains three subbasins, and each subbasin contains a land use called 'Forest'. Using the Grouped option will result in one 'Forest' PERLND, say PERLND 101, contributing to each of the three delineated reaches. Using the Individual option, on the other hand, will result in three 'Forest' PERLNDs, say PERLND 101, PERLND 201, and PERLND 301, with each of these three PERLNDs contributing to one delineated reach. For this tutorial leave the selection set to **Grouped**.



Once the user has specified all of the information required in the **Create Project** window, click the **OK** button. Doing so will call the algorithms that build the new UCI file. The new UCI file is written to the BASINS project folder containing the .wsd file. Portions of the UCI file are created using the .rch, .psr, and .ptf files created when the **New HSPF Project** option was selected in the BASINS GIS interface.

Data sets are created in the project wdm file for the point sources included in the .psr file. The units of the data in these sets are lbs/hour for all constituents except flow, which is in cfs. For each point source data set, the scenario attribute is set to OBS-PT, and the location attribute is set to RCH plus the reach number. These attributes are used by the WinHSPF Point Sources tool to identify point source data sets.

Initial values for some parameters important to HSPF hydrology calibration are extracted from the 'starter.uci' and deposited into the new UCI file. After the UCI is created the main WinHSPF window appears. A schematic diagram of the watershed appears in the main WinHSPF window.

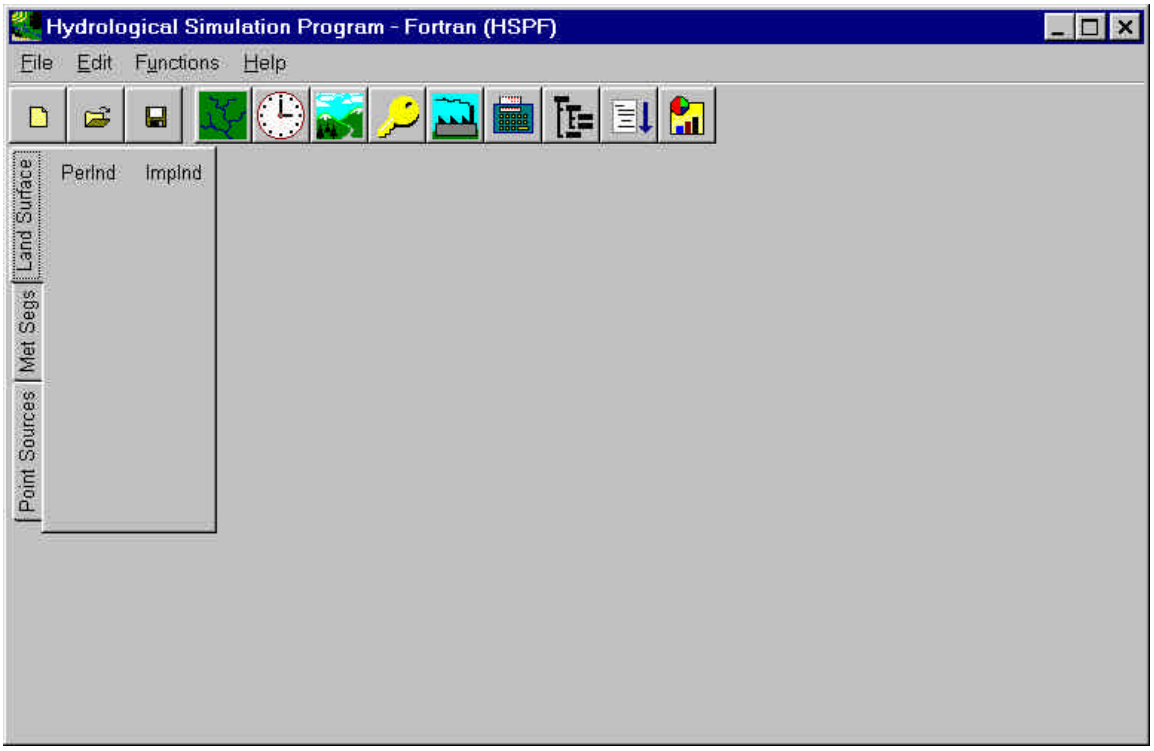


Once the UCI file creation process is complete, the set of files from the BASINS GIS interface (.wsd, .rch, .psr, and .ptf) are no longer used.

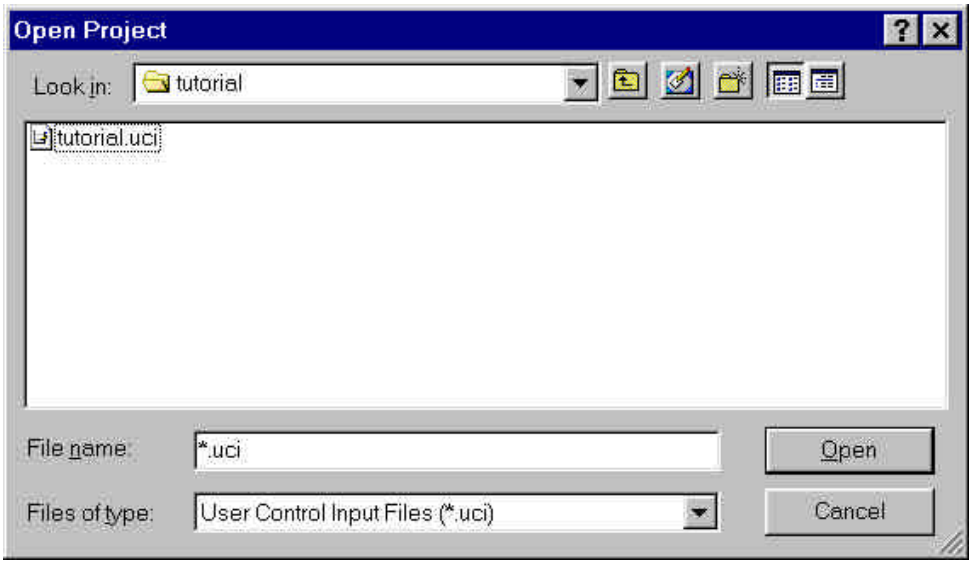
Lesson 2: Opening an Existing Project

Opening an existing WinHSPF project means opening an existing UCI file. Any valid UCI file may be opened by WinHSPF.

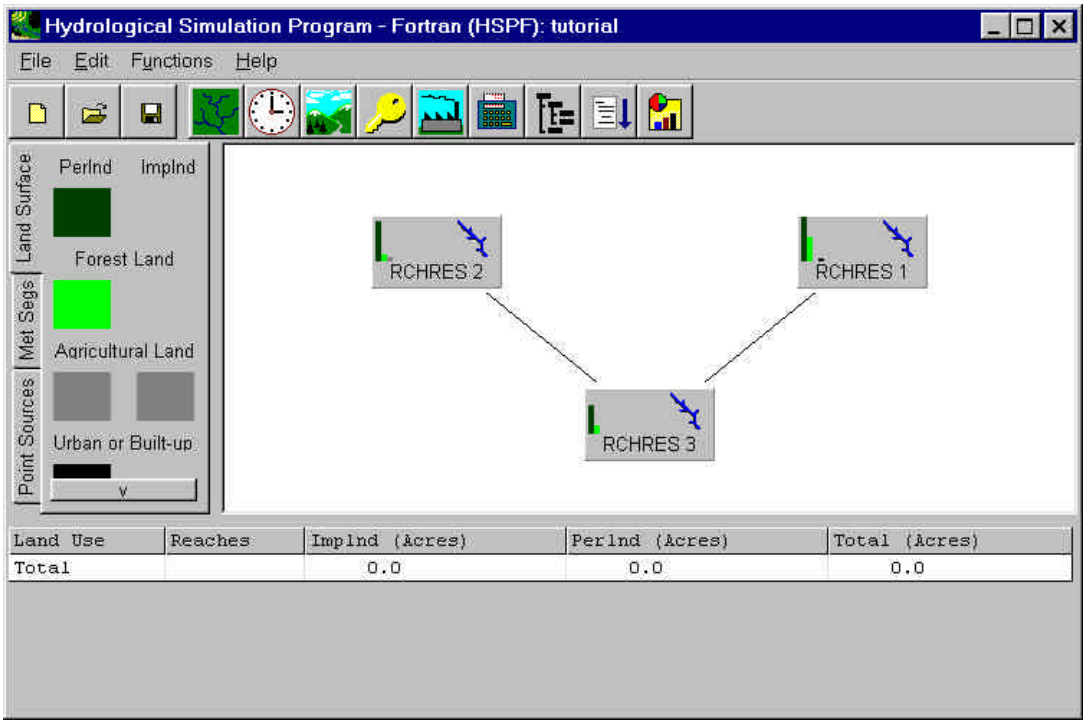
As WinHSPF starts, an initialization process begins, during which the contents of several files are read into memory, including the files 'HspfMsg.mdb' and 'starter.uci'. The progress will be visible in the status window. After initialization the main WinHSPF window appears, entitled **Hydrological Simulation Program - Fortran (HSPF)**.



To open an existing UCI file, choose **Open** from the **File** menu or click the  icon on the toolbar. In the **Open Project** dialog select the tutorial.uci file from the 'tutorial' subdirectory then click the **Open** button.

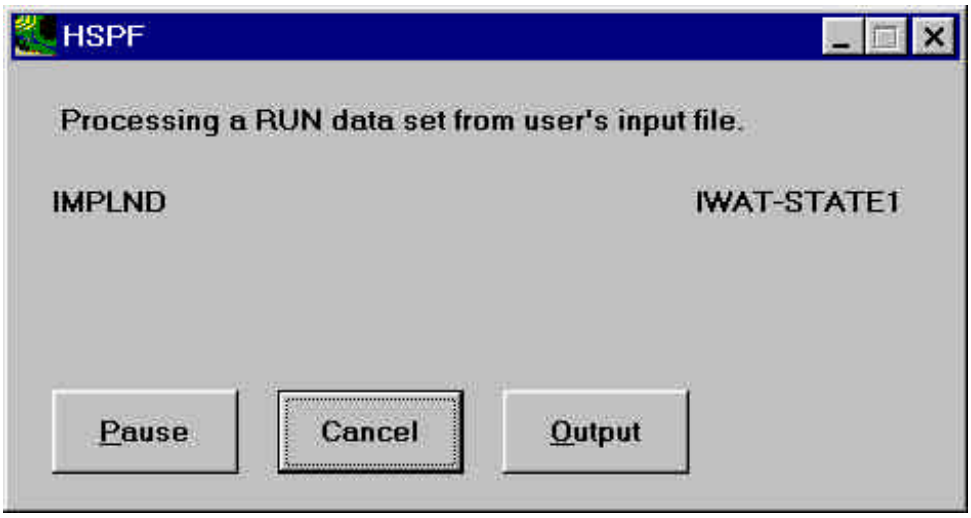


As a UCI file is opened, a status window will provide information related to the progress of reading and interpreting the UCI file. The status window will minimize after the UCI has been processed. A schematic diagram of the watershed will appear in the main WinHSPF window.

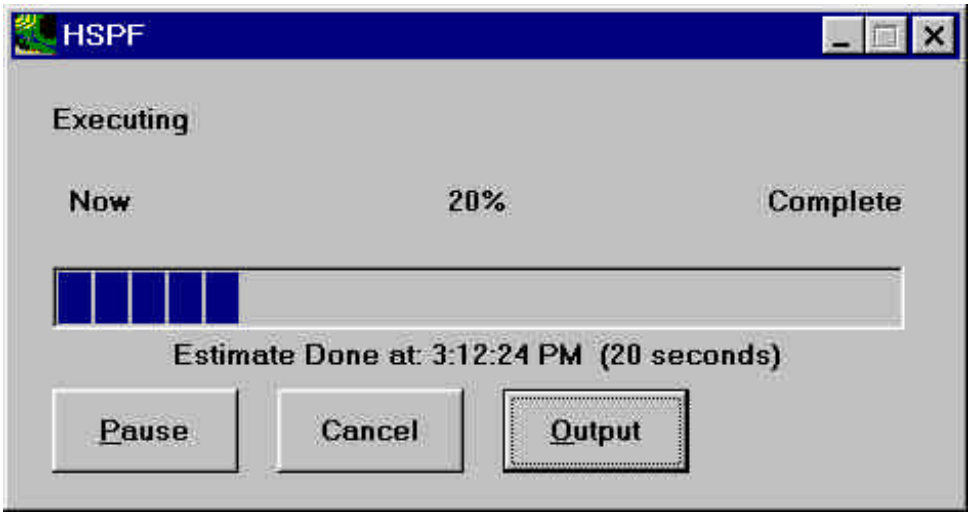


Lesson 3: Executing the HSPF Model

Once a project has been created or opened in WinHSPF, running the HSPF model is simple. From the **Hydrological Simulation Program - Fortran** window, either select the **Functions:Run** menu item or click the  icon on the toolbar. Once the user clicks this button, HSPF begins reading and interpreting the UCI file.

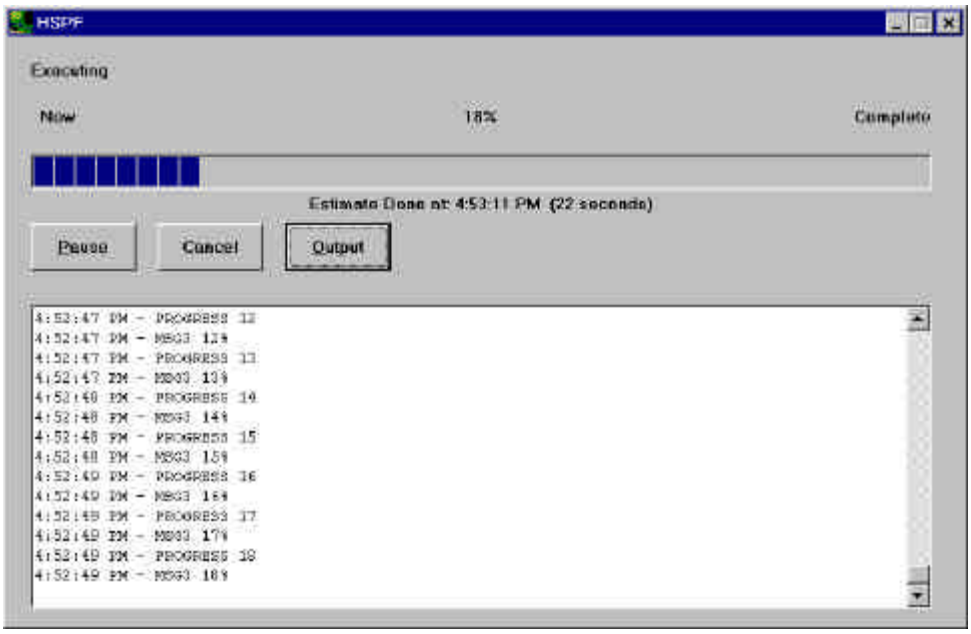


After this interpretation phase is complete, a status window will appear, showing the progress of the simulation.



Once the simulation is complete, the status window will disappear.

In case of error during the execution of HSPF, look at the contents of the status window. More detailed messages may be found by clicking the **Output** button in the status window.



Also be sure to check for run interpreter error messages, which would be written to the HSPF echo file. For a project created with WinHSPF, the echo file should be in the same folder as the UCI file. The echo file name will consist of the base name of the project followed by a '.ech' extension.